Math 155 - Day #9: Compound Interest Review

We found that in general, the amount, A, owed on a loan with annual interest rate, r, compounded n times per year for t years is:

$$A = P \times (1 + \frac{r}{n})^{nt}$$

Suppose that you put \$5500 into a Roth IRA retirement account when you are 25 where you earn 8% interest compounded monthly. How much will be in your account when you retire at 65?
$A = 5500 \times (1 + \frac{.08}{12})^{(12 \times 40)} = 133503.62$

Suppose that you put \$5500 into a Roth IRA retirement account when you are 30 where you earn 8% interest compounded monthly. How much will be in your account when you retire at 65?
$A = 5500 \times (1 + \frac{.08}{12})^{(12 \times 35)} = 89609.02$

Math 155 - Day #9: Compound Interest Review

Suppose that you put \$5500 into a Roth IRA retirement account every year from when you are 25 to when you are 30 where you earn 8% interest compounded monthly. How much will be in your account when you retire at 65?

First, we need to figure out the retirement amount for each age:

age 25: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 40)} = 133503.62$

age 26: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 40)} = 123272.10$

age 27: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 40)} = 113824.70$

age 28: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 40)} = 105101.34$

age 29: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 36)} = 97046.53$

age 30: $A = 5500 \times (1 + \frac{.08}{12})^{(12\times 35)} = 89609.02$

To find the total amount, we add them up: Retirement amount = \$662357.31

Math 155 - Day #9: Compound Interest Review

Suppose you take out a mortgage for $\$200,000$ to buy your first house. Your mortgage has a 4% interest rate compounded monthly. How much interest will you owe after 1 month?

$A = 200000 \times (\frac{.04}{12}) = 666.67$

Suppose that you make a \$955 payment after the first month. How much do you owe on your mortgage after your first payment?

$P = 200000 - 666.67 = 199333.33$

How much interest will you owe in the second month? After another \$955 payment, how much will you owe on your mortgage?

$A = 199333.33 \times (\frac{.04}{12}) = 664.44$

$P = 199333.33 - 664.44 = 198668.89$